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MANIPULATION OF LEARNING SET AND FEEDBACK IN THE TEACHING OF DRAWING.

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DESCRIPTORS- *FEEDBACK, *LEARNING PROCESSES, *STIMULUS DEVICES, *PROBLEM SETS, *FREEHAND DRAWING, COLLEGE STUDENTS, SET THEORY, SPONTANEOUS BEHAVIOR, PHOTOGRAPHS, ART EDUCATION,

IN TWO ART LEARNING EXPERIMENTS, COLLEGE UNDERGRADUATES MADE SEQUENTIAL DRAWINGS, WORKING ALONE IN A STUDIO FOR ONE HOUR A WEEK, WITH STANDARDIZED DRAWING MATERIALS. A HIDDEN CAMERA TOOK TIME LAPSE PHOTOS OF EACH DRAWING. HALF THE TIME THERE WAS A STILL LIFE AS THE DRAWING STIMULUS, THE OTHER HALF NO STIMULUS. DEPENDENT VARIABLES WERE CHANGES NOTED BY THREE JUDGES IN SPONTANEITY, DIVERGENCY, AND AESTHETIC QUALITY. IN EXPERIMENT I, THE IMPLICIT LEARNING SET (STILL LIFE OR MIND STIMULUS) AND PROCESS FEEDBACK (PHOTOS) WERE USED. IN EXPERIMENT II, INDUCED LEARNING SET (SPONTANEOUS OR DIVERGENT STYLE INSTRUCTION) AND LEARNING FEEDBACK (DIRECT OR INDIRECT MEDIATION OF LEARNING PROGRESS INFORMATION) WERE USED. EFFECTS OF FEEDBACK CONDITIONS WERE SLIGHT, WHILE EFFECTS OF LEARNING SET CONDITIONS WERE MORE PRONOUNCED. THE STILL LIFE INCREASED DIVERGENCY, THE MIND CONDITION, SPONTANEITY. IN EXPERIMENT III, THE INDUCED LEARNING SET STRONGLY AFFECTED STYLE IN THE DIRECTION OF STYLISTIC INSTRUCTION AND EFFECTS PERSISTED INTO THE POST-TREATMENT PERIOD. APPARENTLY STRONG, INDUCED LEARNING SETS ARE NECESSARY TO BRING ABOUT ANY NOTICEABLE CHANGE IN DRAWING STYLES, ALTHOUGH SUBTLE EFFECTS FROM IMPLICIT LEARNING SETS CAN BE ANALYZED. THERE WAS LITTLE CHANGE IN AESTHETIC QUALITY. (AUTHOR/AJ)

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[illegible] OF LEARNING SET AND [illegible] IN THE TEACHING OF DRAWING

Report of

KENNETH R. BEITTEL.

In two art learning experiments, college undergraduates made sequential drawings over a six and seven week period. They worked in a laboratory studio, singly, one hour weekly, with standardized drawing materials. An electronically operated camera (out of sight) took time-lapse records of each drawing from an overhead front-surface mirror. Half the time there was an assemblage-like, many-sided still life as the drawing stimulus; the other half, no stimulus was present.

Both experiments had a balanced, five-factor (two levels each) ACV design. Factors A, B and C were classification (sex, art training, and beginning art strategy). Factors D and E were treatment:

	Experiment I	Experiment II
Factor D:	implicit learning set (still life or mind stimulus)	induced learning set (spontaneous or divergent style instruction)
Factor E:	process feedback (more or less process photos for feedback)	learning feedback (direct or indirect mediation of learning progress information)

Dependent variables were spontaneity (style), divergency (style), and aesthetic quality, represented as change scores from the benchmark (pre-treatment) position. Reliabilities for expert judges averaged .818 over the two experiments.

Effects of feedback conditions were slight. In Experiment I more process feedback aided spontaneous S's and those using mind stimulus, while opposed conditions aided divergent S's and those using the still-life stimulus. In Experiment II, direct mediation of learning feedback encouraged gains in spontaneity, while indirect mediation increased divergency.

The effects of learning set conditions were more pronounced. The still-life increased divergency, the mind condition spontaneity (Experiment I, implicit learning set). In Experiment II, the induced learning set strongly affected style in the direction of stylistic instruction and effects persisted into the post-treatment period.

Apparently strong, induced learning sets are necessary to bring about any noticeable change in drawing styles, although subtle effects from implicit learning sets can be analyzed. Aesthetic quality changed but little.

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[illegible] OF LEARNING SET AND FEEDBACK IN THE TEACHING OF DRAWING[1]

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I. The Problem. To aid in the development of learning theory in art education and to further explore the nature of drawing strategies[2] or styles, a series of abstract concepts applicable to the study of learning in art were formulated and operationally applied in two sequential drawing experiments. The concepts were named and organized as follows:

1. Task Environment: Learning Set
   a. Implicit learning set
   b. Induced learning set

2. Feedback
   a. Process feedback
   b. Learning feedback

3. Evaluation (learner response to feedback)

4. Transfer

In general terms, Experiment I varied implicit learning set and process feedback conditions, and Experiment II varied induced learning set and learning feedback conditions.

II. Objectives. Experiment I was organized so that only subtle environmental influences would be brought to bear on subjects, of college age, working singly for hourly periods each week, for seven weeks. Thus, in part, Experiment I was relatively "naturalistic," in order to further describe drawing strategies, in their structural and dynamic aspects. Treatment conditions present were to represent any implicit learning set which might be attributable to drawing stimulus conditions (still-life vs. mental theme) and the effects of varying amounts of process feedback (more or less time-lapse records of drawings in process, made available for evaluation).

The extensive process records obtained from Experiment I were submitted to detailed strategy criteria judgments, which were intercorrelated and then submitted to factor analysis and factor rotations in an effort to arrive at simple structure.

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[1] U. S. Office of Education Cooperative Research Project No. 3149, The Pennsylvania State University, University Park, Pennsylvania, 1966.

[2] See references 1, 2, 3 and definitions, Appendix A.

In Experiment II more direct treatment conditions were brought to bear. An *induced learning set* was present in the form of detailed style instruction, in one case toward the spontaneous strategy, in the other toward the divergent. *Learning feedback* was represented by direct vs. indirect mediation of information on how the *induced learning set* related to the subject's drawings.

III. Methods. Both experiments were set up as balanced, five-factor analysis of variance designs, with two levels for each factor. Factors A, B and C were synonymous for both experiments. These were classification or organismic factors: A, sex (A-1 male, A-2 female); B, art training (B-1 art major, B-2 non-art major); and C, art strategy at the start of the experimentation (C-1 spontaneous, C-2 divergent). Factors D and E were treatment factors, which were different for each experiment. As indicated above, in Experiment I, factor D represented an *implicit learning set* condition (D-1 still-life drawing stimulus, D-2 mind or mental drawing theme). Factor E dealt with *process feedback* (E-1 more process feedback, E-2 less process feedback). There was a *transfer* condition built into Experiment I, in which following the three treatment weeks (weeks C, D and E), the *implicit learning set* conditions were reversed (those who had drawn from the still-life drew from mind and *vice versa*). Also, at the close of the experiment I (week G), subjects were given capsule information concerning drawing strategies and then asked to simulate the opposite of what they perceived their own strategy to be.

Around 12,000 in-process drawing records in the form of time-lapse photographs, averaging 20 per drawing, were obtained from Experiment I. These were judged by three art judges on 18 criteria,[3] nine in each of the two strategies. These criteria were a shorter version of the 48 criteria described in an earlier study (reference 1). Judgments were analyzed for reliability, then pooled across judges and the 18 criteria were intercorrelated, then submitted to a principal components factor analysis, subsequently to a varimax rotation.

In Experiment II, factor D was an *induced learning set* condition (D-1 instruction toward the spontaneous style, D-2 instruction toward the divergent style). Factor E dealt with *learning feedback* (E-1 direct mediation of information related to the *induced set*, E-2 indirect mediation).

In both experiments the main dependent variables were changes noted over beginning (pre-treatment) benchmark in spontaneity, divergency and aesthetic quality. The first two were judged from the in-process, time-lapse photo series; the latter, from the drawings themselves.

Experiment I covered seven weeks; Experiment II six weeks. Because of problems noted in classification variables in Experiment I, wider screening of subjects prior to experimentation took place for Experiment II.

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[3] See Appendix B.

Subjects drew singly at a drawing table, with constant drawing pad, media (India ink with wash optional) and tools (four sizes of brushes and a drawing pen). Without being interrupted, a camera which was automatically timed and operated took photographs off a front-surface mirror mounted above the drawing surface at a 45 degree angle. The camera was out of sight. When the still-life was not used as a drawing stimulus, the subject was surrounded by plain white walls. The still-life was multi-lit from one corner and could be positioned to suit the subject.

Subjects were largely sophomores. They were volunteer and were given $10.00 honorarium if they completed the experiment. The design called for 32 subjects in each experiment.

Analysis of variance was used to analyze the two experiments, using gain or change scores over beginning benchmark. All five four-way interactions were incorporated into the error term, giving that term six rather than one degree of freedom.

IV. Results and Conclusions. Judgments of strategy and aesthetic quality were highly reliable in both experiments (averaging between .80 and .90). For a summary of findings related to treatment conditions, see Table 1.

Feedback conditions were relatively weak in their effects (and possibly in their operational representation in the experiments). Effects noted were congruent with prior findings on strategies (references 1, 2, 3) and in interaction with learning set conditions helped to extend that knowledge.

More process feedback aids subjects classified as spontaneous and those drawing from the mind, whereas less process feedback aids divergent subjects and those drawing from the still-life. (Experiment I.)

Learning feedback, represented by direct and indirect mediation of information related to the induced learning set, had few effects and was without interaction. Direct mediation is associated with gains in spontaneity, indirect with gains in divergency. There was a tendency for subjects receiving indirect mediation to show post-treatment gains in aesthetic quality. (Experiment II.)

Learning set conditions yielded clearest outcomes. An implicit learning set, as represented by drawing stimulus conditions in this study, can be read on style and quality changes. This is especially so when transfer effects are studied by reversing drawing stimulus conditions. The still-life increased the divergency ratings of drawings; the mind condition increased the spontaneity condition. Subjects worked longer from the still-life than from the mind. Male subjects were more influenced by drawing stimulus conditions than female. Subjects reacted favorably to the combinations of still-life and less process feedback, and, conversely, to mind stimulus and more process feedback. There was a tendency for works done from the still-life to be judged as of higher aesthetic quality. (Experiment I.)

The induced learning set, represented by detailed stylistic instruction, greatly affected stylistic changes in the direction of instruction, without interaction, with little influence on aesthetic quality (and that

TABLE 1

Summary of Significant Effects on the Treatment Variables

Feedback Conditions

	More Process Feedback	Less Process Feedback
Experiment I:	Spontaneous S's see work as more active S's working from mind see work as better	Divergent S's see work as more active S's working from still-life see work as better
Experiment II:	Direct Mediation of Learning Feedback Gains in spontaneity	Indirect Mediation of Learning Feedback Gains in divergency Gains in aesthetic quality

Learning Set Conditions

	Implicit Learning Set: Mind	Implicit Learning Set: Still-Life
Experiment I:	Gains in spontaneity Shorter working time Higher aesthetic quality when combined with more process feedback	Gains in divergency Longer working time Higher aesthetic quality when combined with less process feedback
Experiment II:	Induced Learning Set: Style Instruction Toward Spontaneity Strong, persisting gains in spontaneity	Induced Learning Set: Style Instruction Toward Divergency Strong, persisting gains in divergency

delayed), and these effects persisted into post-treatment drawings with little recovery toward the benchmark style. (Experiment II.) A similar effect occurred at the close of Experiment I when subjects were asked to simulate the opposite of their perceived style and did so quite capably.

Comparing Experiment I with II, it appeared that change was not clearly observable through mere repetition of drawing sessions over a seven week period, even under what were felt to be good conditions for self-change and learning.

It was concluded that the concept of drawing strategies is sensitive and important to the study of learning and change in art. Detailed strategy criteria were shown to be highly intercorrelated. Six factors of criteria clusters, obtained by factor analysis, were themselves highly intercorrelated.[4] Since these factors, however, did not show criteria as matching one to one on the two strategies or occurring on the same factor, it appeared that the strategies should not be judged on bipolar scales, despite their high negative intercorrelation.

Characteristics attributable to sample classification factors indicated that it is difficult to find divergent art males and spontaneous non-art males. Spontaneous subjects, male subjects, and art majors were more reactive to experimental influences. Gains in aesthetic quality were more associated with divergent subjects, female subjects, and those receiving divergently related implicit or induced learning sets. This suggested a tie between gains in aesthetic quality and lesser reactivity, greater adaptation to treatment conditions.

Though not a bona fide conclusion, it was felt that the search for abstract concepts and their subsequent use in a structured sense in relation to experimentation were valuable and justified procedures for an emerging psychology of art.

V. Implications and Recommendations. Strategies appeared to be plastic, open to subtle and conscious change, and to direct instruction, despite a near taboo on this score in art education. Although some "fit" can be found between style in art and personality dynamics, the connection was felt to be much more tenuous than the literature would have it. It was reasoned that not personality, but the logic of the role one assumes in choosing a strategy or style (consciously or by long-standing habit) is the clue to the observed linkages between style and experimental conditions. The data observed were seen as matching information processing and directed thinking processes attributed to the two strategies: internal stimuli and "flow" for the spontaneous (with direct interpersonal dynamics); external stimuli and "bits" for the divergent (with indirect interpersonal dynamics).

As mentioned earlier under conclusions above, change and learning were not observable over a series of drawing sessions, under "good" but "neutral" conditions. This does not mean that no one changed or gained, but that no

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[4] See Appendix C.

order was often in gains or losses. For the latter, apparently stronger forces in the learning environment such as the induced learning set, appear to be needed.

Strategy or style was seen to be more open to change under treatment than aesthetic quality.

In general, it was recommended that theory-building efforts closely tied to experimentation continue.

As an aid to more explanatory power in the language used to judge and report changes in strategies, simulation of drawing styles and strategies by computers and simpler means was urged. Such an effort would require operational and transformational concepts, with evaluative or test criteria specified, as contrasted to the present passive, descriptive language which often hides test and evaluative criteria within it.

Subjects perceived their own styles with fair objectivity. Since, in addition, they could consciously manipulate their strategy, further experimentation might contrast self-chosen induced learning set and learning feedback conditions with those arbitrarily assigned (as in this study).

Since styles or strategies only indirectly touch on the important symbol-making, motivational, myth-generating -- in short, the extra-aesthetic pretext -- side of art, it was the researcher's hunch that the strong induced learning set dealing with direct stylistic instruction might with profit and insight be crossed with an equally strong induced learning set dealing with "symbol content sources." It was realized that there is presently no clear logic on how to structure this concept and represent it in experimentation, but experimentation in itself might provide both foothold and feedback for a fruitful approximation and its reformulation.

References

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3. Beittel, Kenneth R. and Burkhart, Robert C. "Strategies of Spontaneous, Divergent, and Academic Art Students." Studies in Art Education, V, No. 1, Fall 1963. p. 20-41.

In general, strategy refers to "regularities of decision-making" of an identifiable nature, typically revealed in a problem solving context. (Jerome S. Bruner et al., A Study of Thinking, New York: John Wiley & Sons, 1956, 330 pp.)

The Spontaneous Strategy in Art

The Spontaneous Strategy in Art, in broad terms, exhibits a beginning big organic statement devoid of detail but suggestive of a whole picture. Through progressive medium interaction, centralization, movement, incorporation of process-inspired accidents, and suggestion, students using the spontaneous strategy focus on the whole problem as they feel it and try to solve it through procedural experimentation.

The Divergent Strategy in Art

In the Divergent Strategy, the student typically begins by drawing with considered fine line control a single element which in some portion shows the early inclusion of relatively precise detail. As new elements are added, an alteration of viewpoint and shifting of focus is likely to occur, and the work is off-center and tensional. Through line, black-white contrasts and positive-negative figure-ground reversals, the work undergoes unexpected changes, and becomes flatter and often simpler.

APPENDIX B

Eighteen Criteria Used for Detailed Judgment
of Drawing Processes in Experiment I

TYPE OF LINE	1.	Diversity of line; open or broken contours (process-related) (S)
	2.	Fine line control with limited line variation (D)
ARRANGING	3.	Overall early structural statement, undetailed but inclusive; central emphasis (S)
	4.	Single element focus, detailed and partial; off-center emphasis (D)
ABRUPT MEDIUM	5.	Abrupt medium changes (D)
	6.	Continuous medium variation (S)
DETAIL	7.	Suggestion (S)
	8.	Elaboration; precision; pattern (D)
MOVEMENT	9.	Direct, flowing movement: action gestures (S)
	10.	Concern for contour, formal distortion (D)
SPACE	11.	Plane: eye travels path of forms; frontal plane; position in space affirmed; floating; lateral tension; transparencies and overlapping of flat planes (D)
	12.	Recession; eye penetrates space; many planes, not clearly separated; position in space sought; depth tension (S)
CONTRAST AND RHYTHM	13.	Irregular broken lights; medium as texture (S)
	14.	Solid regular areas of black and white; black-white reversals; surface patterns (D)
THEME	15.	Emphasis on process and medium usage; objects of subordinate interest (S)
	16.	Size relationships manipulated
	17.	Theme and variation of same element (D)
	18.	"Organic" and progressive development; enrichment of initial overall structure (S)

APPENDIX C

Six clusters as a result of a Factor Analysis of the 16 strategy criteria as listed in Appendix B.

SPONTANEOUS

1. Process Dialogue
   (a) Diversity of line (1)*
   (b) Suggestion (7)
   (c) Action gestures (9)
   (d) Process emphasis (15)

2. Spatial Continuity
   (a) Medium variation (6)
   (b) Recession (12)
   (c) Broken Rights (13)

3. Big Central Attack
   (a) Early statement (3)
   (b) Organic development (13)

DIVERGENT

4. Controlled Detail
   (a) Fine line control (2)
   (b) Single element, off-center (4)

5. Elaboration and Pattern
   (a) Abrupt medium changes (5)
   (b) Pattern (8)
   (c) Solid black-white (14)

6. Segmented Form and Space
   (a) Formal distortion (10)
   (b) Plane (11)
   (c) Size manipulated (16)
   (d) Theme and variation (17)

* Numbers in parentheses refer to the original criteria in Experiment I as shown in Appendix B.

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